Electricity Policy Review

Department of Mines and Energy
Energy Branch

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Foreword

For the electricity industry in Newfoundland and Labrador, the late 1990s was a distinctive period for a number of reasons, including:

- the proclamation of legislative changes in 1996, which gave the Board of Commissioners of Public Utilities full authority over Newfoundland and Labrador Hydro, including the approval of the selection of future power projects;
- significant public opposition to many small-scale hydroelectric projects, even though in most other jurisdictions, such projects are considered environmentally preferable;
- implementation of competition in electricity supply in several US regions; and
- the commencement of new negotiations with Québec on Lower Churchill development.

Accordingly, Government decided that it was time to examine the industry in all its aspects and to develop a comprehensive set of policies by which to govern it in the 21st century.

This report, which reviews the existing policies and future options, is the first step in this process.

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Part I: Introduction

Background

In Canada, almost all aspects of the electricity industry are under the authority of provincial governments. As a result, the industry follows the political map more so than the geographic map, with each province having a system which utilizes the energy resources most economically available to produce power to serve consumers in that province. There are interconnections between adjacent provinces and between provinces and the United States, but these are generally small in relation to the capacity of the total system in each province. The exceptions are where individual generating plants have been built to export power, for example, Churchill Falls.

The resulting inward focus is heightened in this Province due to the concentration of the population on the Island of Newfoundland and the absence of electrical interties from there to either an adjacent province or to Labrador. The fact that our population resides in two, electrically-separate regions, which have very different characteristics, means that much of this report has to deal separately with one or the other region.

The provincial electricity industry was born in the 1890s and was for over half a century exclusively the domain of the private sector. On the Avalon Peninsula, utilities were created by investors which generated power locally, to serve the main concentrations of people. Elsewhere, electricity generation was established in conjunction with resource industries and supplied to company towns such as Grand Falls and Corner Brook. Small communities at any distance from a major population center had no access to electricity.

By the late 1950s, communities without power were demanding it, and those with access were demanding additional, and more reliable, power. Government of the day took two major steps. It created one commission to bring about wider availability of electricity under the "Power Distribution Districts" and, about 10 years later, another commission to undertake the construction of a major new power source, Bay d'Espoir, and a transmission grid to link generation with the main areas of power consumption. Today these commissions are integrated as Newfoundland and Labrador Hydro (NLH). In the same general time period, the various small utilities were combining and assuming responsibility for power distribution in former company towns, resulting in the current form of Newfoundland Power (NP).

In Labrador, the situation evolved differently. Prior to the Churchill Falls project, there was 'company town' power in Western Labrador; all other communities, including Happy Valley - Goose Bay, were isolated and supplied by small diesel plants. However, with the inauguration of Churchill Falls and the purchase of Brinco's share by Government, the presence of NLH became dominant, and NLH has since that time assumed responsibility for all the electricity industry in Labrador.

Electricity service in the Province is now universal and technically comparable with any other jurisdiction in the industrial world.

But things are changing elsewhere in the business. At the beginning of the twentieth century, electricity was a luxury available in limited quantities to wealthier citizens of larger communities. By the end of the century electricity was a fundamental prerequisite for 'modern' living.

Today there is an expectation by everyone that access to whatever power is wanted at the lowest possible cost is a basic right. Together, industries and governments in most industrialized countries met these demands very successfully. Generally, monopolies were allowed to develop for all activities involved: the generation of power, its transmission to consuming areas, its distribution within those areas and the final sale to consumers. Among different countries, government involvement has varied, but even in the United States where private-sector activity is generally preferred, government got involved in the development of the largest projects which allowed the generation of low-cost power and facilitated large-scale industrial development. With these monopolies came the need for independent regulation, to ensure that captive consumers were not unfairly exploited.

In the 1990s , dissatisfaction with monopoly utilities began to emerge in some countries, not so much over the availability of power, but over its cost. Criticism emerged of the policies and practices of utilities and regulators; some proposed that largely unregulated competition among private companies would bring about lower prices without sacrificing availability or reliability. As the twentieth century closed, this had become the prevailing wisdom in most of Europe and the United States. In Canada, both Ontario and Alberta are moving in that direction, and New Brunswick recently indicated this is its likely future direction. Nova Scotia has signaled the intent to open its transmission system.

This fundamental shift in the structure of electricity industries is described by its supporters as a cure for all the perceived ills of the industry. In reality, many jurisdictions have found the transition far from simple: it is very easy to develop a competitive market that is far more beneficial to producers and marketers than to the vast majority of consumers. The winter of 2000-2001 demonstrated this clearly in California.

Terms of Reference

In August, 1998, Government directed the Department of Mines and Energy to conduct a comprehensive review of all policies related to the electricity industry in the Province, with a particular focus on six aspects:

- the structure of the industry
- the regulatory regime
- the pricing of electricity
- future electricity supply options
- the use of electricity as a tool for economic development
- experience in other jurisdictions

This report is the result of the review, carried out by department staff with assistance from external consultants.

One point cannot be made too strongly. Decisions on the basic structure of the industry have very significant implications for all the other aspects considered in this review. However, given the mix of public and private utility ownership existing today, some fundamental decisions should perhaps be taken only after a period of consultation. This report, therefore, is designed to establish the basis and options for these consultations.

Objectives of the Electricity Policy Review

The main goal of Government in Newfoundland and Labrador with respect to the electricity industry is to secure the maximum benefits for the Province from the development and utilization of our resources. In the larger context, this has to be achieved in a manner consistent with sustainability, environmental impact, social goals and other constraints.

In addition, the electricity industry must continue to serve people's domestic needs and the existing commercial and industrial customer base with reliable power at fair cost and to support efforts to attract any new commercial or industrial activity by being as competitive as possible with other jurisdictions.

From this perspective, the objectives of the Electricity Policy Review were formulated as:

i) to ascertain whether any policy alternatives for the structure, regulation and pricing methodology offer improvements in cost level, cost stability or service quality compared to what may be expected under the current situation;

ii) to evaluate what opportunities exist for the use of electricity as a tool for economic development;

iii) to review the sources of future electricity generation, particularly for the Island system, with a focus on the policy approach towards small-scale hydroelectric projects;

iv) to review the legislation and other aspects of policy governing the industry.

Significant Issues

In conducting this policy review, five significant policy-related issues were identified. The nature of these issues is described in this section of the report. The relevance of various policy options on these issues will be discussed in the sections concerning the options, together with the solutions each option presents. In order to provide consistency, these issues will be referred to as:

Accountability Conflict;
Selection Process for New Projects;
Cost/efficiency Issues;
Regulatory Reform; and
Future Generation.

All of these issues have a bearing on the role of the electricity industry in economic development.

Accountability Conflict

NLH and its Board of Directors face conflict in being accountable to both Government, as owner, and to the Board of Commissioners of Public Utilities (PUB) as an independent regulator with legislated responsibility for focusing on customer cost and system reliability and authority over system planning.

This situation resulted from 1996 legislative amendments. These amendments began at a time when privatization of NLH was contemplated. Prior to their enactment, NLH was accountable only to Government with respect to its capital budget and major decisions such as the selection of new power sources. PUB's role was to examine the resulting costs and the operational costs of the Crown utility and recommend the rates to be charged to NLH's customers. This arrangement allowed Government to direct major decisions of NLH with due regard for the *overall* public interest. Public accountability was maintained through the electoral process.

The fact that the *Hydro Corporation Act*, in its current form, also supports an arms-length relationship between Government and NLH, has the effect of providing ultimate authority to PUB in relation to NLH.

This situation may have been quite appropriate in the context of a potential privatization of NLH. Since privatization is definitely not being considered, it may be inappropriate in today's context.

Selection Process for New Projects

The second issue identified is that of the process to be followed for future generation project selection, especially when both the private sector and NLH have projects to propose. In order to evaluate competing proposals, detailed system knowledge, data, expertise and tools are required. Selecting a generation project is not like tendering for other services. Project location and the individual project's characteristics are important, not simply price. At present, only NLH is equipped with the necessary elements to evaluate all aspects of proposed projects of any significant size.

Choosing an appropriate selection process is important. Almost all jurisdictions in Canada and the US provide some level of involvement for the private sector in providing new generation. Not to do so would go against this trend and may result in the best projects not being selected. Some jurisdictions, for example Québec, do retain for their Crown utility the right to develop larger hydroelectric projects.

There is no apparent impediment to private-sector involvement in generation, but the project selection basis must be clear, demonstrably unbiased and as transparent as possible in order to prevent dispute. This is not a problem if NLH has none of its own projects to offer. However, when it does wish to consider projects it would own, there is a likelihood of the perception of conflict of interest if NLH is also the party which evaluates projects as well.

This was the case in 1997. Faced with a requirement for 200 Megawatts of new generation for the Voisey's Bay Nickel smelter/refinery and with the legislated requirement to satisfy PUB that the proposed development(s) represented the lowest cost, NLH issued a Request for Proposals for new generation. NLH also had as options several projects within its own domain, such as the Granite Canal hydroelectric project in the Bay d' Espoir system and a new unit at Holyrood.

Because of NLH's dual role as proponent and evaluator, the Minister of Mines and Energy at the time took the step of engaging an independent review to assess NLH's recommendations. Although the entire process was halted by the postponement of the Voisey's Bay project, this may be considered to indicate a need for independence in the selection of new generation.

Cost/Efficiency Issues

On the Island of Newfoundland, two utilities provide distribution service to residential and commercial customers in distinct service territories (see Figure 1). This is believed by some to result in inherent inefficiency due to the duplication of services and extra cost in servicing boundary areas.

Figure 1. Island Utility Service Territories
(NLH - Yellow, NP - Green)

That the existing industry structure contains inherent inefficiencies has been indicated on at least two previous occasions. The 1973 *Report of the Study Group on Energy to the Provincial Planning Task Force* recommended that "If the investor owned utilities[1] on the Island merge, those areas served by the Power Distribution District[2] from the Island Power Grid be transferred, where possible, to the resulting distribution company".

Today, all the earlier distribution companies are part of Newfoundland Power, yet NLH retains a patchwork of areas where it provides distribution service. The fragmented nature of this territory is widely considered to be part of the reason why NLH does not recover the cost of servicing these customers when they pay the same rates which are charged to NP customers, based on NP's cost of service.

The second instance where these inefficiencies were identified was the analysis carried out by NLH's financial advisors on the 1989-91 offers by Fortis to acquire some of NLH's transmission and distribution assets. This analysis concluded that, "The acquisition of NLH's distribution areas and assets 'would achieve certain efficiencies for the industry as annual operating costs would be reduced by approximately $5.4 million'." The Fortis offer included the transfer to NP of 'all Hydro generating plants less than 30 MW, all Hydro transmission and terminal facilities at voltages lower

1 *At the time, these were Newfoundland Light and Power and Bowaters.*

2 *Now NLH.*

than 230 kV and all of Hydro's distribution facilities in the interconnected system on the Island, in Labrador, and all the isolated systems'.

Regulatory Process Reform and Electricity Pricing

The regulatory system for the electricity industry in the Province was designed more than forty years ago. It employs an approach (which was then widespread) whereby a utility presents a forecast of its costs to a regulatory panel, including a rate of return, together with its forecast sales, and the panel sets an electricity price which recovers the costs. This system does control prices and utility profits. However, there are a number of inherent problems:

- Utilities can earn greater profits by persuading regulators to allow more investment, whether in power plants or new office equipment. Since a utility is allowed to include all its capital and operating costs in the rate base, there is no incentive for the company to become more efficient. If its profits grow, the regulator will reduce rates to bring the rate of return back to the approved level;

- The rate-setting process, which usually includes judicial-style hearings, is cumbersome, time-consuming and expensive. Small consumers and householders, even when represented by a consumer advocate, are often at a disadvantage in arguing effectively against the technical and legal experts available to utilities;

- Any change in the rate paid by NP to NLH for power necessitates a consequent application for rate changes by NP, because the cost to NP of purchasing power from NLH is considered one component of NP's cost of service;

- A utility regulated in this manner has an incentive to maximize sales in order to ensure its actual return on rate base is at the upper bound of the range allowed by PUB. If it successfully promotes improved energy efficiency or demand-side management which could lower overall costs, its revenues will decline faster than its costs and its profits will fall to the lower end of the range.

The reform of the regulatory process and electricity pricing are discussed in Part 3 of this report.

Future Generation

Future generation sources, particularly the question of whether policy should preclude further small hydro development, were also identified as an issue. In many other jurisdictions in Canada, the US and Europe, small-scale hydro is generally considered environmentally acceptable and to be beneficial overall. In this Province, the emergence of proposals for small-scale hydro resulted in vocal opposition from a number of special-interest groups.

This issue is discussed in Part 4 of this report.

The Electricity Industry in Newfoundland and Labrador Today

Governing Legislation

There are three primary pieces of legislation governing the electricity industry in the Province: the *Public Utilities Act* (PUA), the *Newfoundland and Labrador Hydroelectric Corporation Act* (the *Hydro Corporation Act*) and the *Electrical Power Control Act 1994* (EPCA).

The PUA sets out the structure and powers of the Board of Commissioners of Public Utilities (PUB) and provides its authority to regulate electrical utilities, as well as its other functions. Very small generators (less than 1 megawatt) and generators which sell only to another regulated utility are exempt.

The definition of public utility includes companies which sell water or heat or remove sewage. Municipal governments providing water supply and sewers are exempted. Companies providing telecommunications services are also public utilities, although this industry is now under federal regulation.

Government is permitted by the PUA to inform the PUB of Government policy and objectives which the PUB must subsequently take into consideration in performing its duties. At present, this is done primarily by the EPCA (see below). Additional direction can be made through an Order-in-Council, but this would be a cumbersome approach for many matters which arise in the course of business.

The PUA provides authority for PUB to levy assessments on regulated utilities to recover its ongoing costs. In addition, utilities applying to PUB for decisions involving hearings are liable for the cost of the hearings and related costs.

The PUB has wide-ranging authority under the PUA to make enquiries, set rules and demand the submission of documents in the course of its duties.

The PUA also contains some specific rules about utility practices, such as requiring PUB to approve the abandonment of any lines or works, not infringing on another utility's service territory without agreement and not interfering with another utility's service by changing its own systems or equipment.

The approval of the PUB is also required under the PUA for any sale, assignment or transfer of all or part of a utility's assets.

The obligation of utilities to supply power on request is part of the PUA. Provisions are also made that utilities can charge interconnection costs allowed or ordered by the PUB when a customer is more than 100 meters from the nearest available supply point.

The PUA is specific about the manner is which rates are established. It requires the PUB to calculate a 'rate base' for each kind of service a utility provides. These rate bases must include a share of the value of the property and assets of the utility and may include numerous other costs at the discretion of the PUB. The utility is then allowed to earn a 'just and reasonable' return on that rate base.

The PUA also provides several avenues for complaints and appeals by customers or other interested parties against utilities. The Act also stipulates penalties for violations of the Act.

The *Hydro Corporation Act* is the main governing act for NLH. It lays out the fundamental character of NLH as a Crown corporation, defines the structure and composition of its Board of Directors and gives the Lieutenant-Governor in Council authority to appoint directors, the Chair. The President and the Chief Executive Officer are appointed by the shareholder(s), currently the Minister of Finance. These positions may be held by one, two or three persons.

The Act also gives the purpose of NLH's existence.

> "The objects of the corporation are to develop the use of power on an economic and efficient basis, and, in particular, to engage in the province and elsewhere in the development, generation, production, transmission, distribution, delivery, supply, sale and use of power from water, steam, gas, coal, oil or other products used or useful in the production of power, and to supply power, at rates consistent with sound financial administration, for domestic, commercial, industrial or other uses in the province, and subject to the prior approval of the Lieutenant-Governor in Council, outside of the province."

The Act gives the Board of Directors a significant degree of autonomy in running NLH. The Board appoints executives (except the CEO) and management and "shall exercise the powers and discharge the duties of the corporation and administer and manage its business".

The autonomy is not complete. Some actions the corporation may take require the approval of the Lieutenant-Governor in Council. These include:

- establishing, selling or dealing in shares of a subsidiary of NLH;
- borrowing money (except for terms less than 2 years where the Lieutenant-Governor in Council sets a cap); and
- securing the repayment of money borrowed.

The Act also makes NLH and its employees subject to the *Public Sector Restraint Act 1992*, which places another limitation on the Board's autonomy.

NLH is required by the Act to submit its annual budget to the Minister of Mines and Energy, but the Minister's approval is not required by the Act. Approval of the capital budget by PUB is required under the PUA.

The *Hydro Corporation Act* also includes transitional arrangements for the change from the pre-1996 situation of PUB having limited oversight of NLH, to the current circumstance of full authority of PUB.

The final major piece of legislation governing the industry is the *Electrical Power Control Act 1994* (EPCA). The first part of this Act sets out Government's policy regarding the electricity industry. It orders that rates are to be reasonable and not unjustly discriminatory, based on at least one year's forecast of costs and provide a just and reasonable return to producers and retailers. It specifically exempts industrial customers from contributing to the subsidy required for rural customers' rates.

The Act also states that all sources and facilities for producing and transporting power should be managed and operated in a manner that results in the most efficient functioning, providing consumers with equitable access to adequate power at lowest possible cost consistent with reliability, allowing generation owners first priority to use their own power and ensuring, where these objectives can be achieved through alternative sources of power, the least possible interference with existing contracts. It also states that "planning for future power supply of the Province shall not include nuclear power".

The EPCA directs the PUB to implement the declared policy. It states that the Lieutenant-Governor in Council can refer power matters to the PUB for enquiry and provides authority for the Lieutenant-Governor in Council to direct the PUB on policies and procedures for determining rate structures, setting and subsidizing rural rates, fixing a debt-equity ratio for NLH determining a phase-in of a rate of return for NLH.

In Part II of the EPCA, PUB is given authority and responsibility to ensure that adequate planning occurs for the electricity industry. The remainder of Part II deals with anticipated shortages giving PUB authority to allocate power if this should occur.

Part III of the EPCA deals with power emergencies when the Lieutenant-Governor in Council has declared a state of emergency and has appointed an emergency controller.

Part IV is concerned with regulating the corporate governance of electricity retailers, limiting share ownership to 20% and restricting other business activities of a retailer, but not its parent company, to electricity production, transmission, distribution and retailing. This part has not been proclaimed to date.

Before the Province was part of Canada, the electricity system operated at the European standard for the frequency of the alternating current. The North American standard is different. Part V of the EPCA includes provisions for a retailer to change the frequency of its power. There is still some European-frequency equipment operating on the Island, associated with the Grand Falls and Corner Brook paper mills.

The final part of the EPCA, Part VI, contains general provisions regarding PUB powers, PUB enquiry costs, appeals, regulations, offences and penalties.

There are other Acts which are specific to the electricity industry, including the *Churchill Falls Lease Act* and the *Lower Churchill Development Act*. These Acts are specific to projects and do not impact the general governance of the industry. As Newfoundlanders and Labradorians are aware, the Churchill Falls power contract and the legislation which supports it has not been successfully challenged.

The *Lower Churchill Development Act* includes authority for an agreement between the Gull Island Power Company (GIPCo.), a subsidiary of NLH and the Lower Churchill Development Corporation (LCDC), owned 51% by NLH and 49% by the Government of Canada, under which LCDC has an option to acquire the water rights and engineering work on Lower Churchill owned by GIPCo. This is not an impediment to developing Gull Island with other partners, since the option can be canceled by LCDC which the Province controls.

Other legislation of general application also applies to the industry.

Power and Energy

In any discussion of electricity supply and demand , it is important to distinguish between the ***rate*** *at which* ***power*** *can be generated (or the rate at which it is used) and the aggregate of all generation* ***over time****, which is the* ***energy*** *used.*

The system must have sufficient generators to be able to match the highest rate of power use expected. This is called the peak demand and, like the size of individual generators, is measured in Megawatts (MW). In addition, the system must have enough units to cover an unexpected breakdown at the time of peak demand.

The system must also be able to supply all the electricity customers use throughout the year. This amount is the energy requirement and is measured in multiples of watt-hour - for example, the kilowatt-hours shown on a residential bill. To avoid constant repetition of millions, billions, etc., we use larger units where appropriate.

1000 kilowatt-hours = 1 Megawatt-hour (MWh)
1000 Megawatt-hours = 1 Gigawatt-hour (GWh)

Customers

In Newfoundland and Labrador, the generation and distribution of electricity is provided by two utilities, Newfoundland Power (NP) and Newfoundland and Labrador Hydro (NLH). Together, NP and NLH serve about 280,000 customers. The majority of customers are connected to the island interconnected system which has almost 1,900 MW of generation. In Labrador, most customers are served with power by NLH from the Churchill Falls hydroelectric facility. Customers in 25 isolated communities in Labrador and on the Island are provided with power from diesel generators.

There are also four major industrial enterprises on the Island system which are served by NLH directly from the high voltage transmission grid. They are the Abitibi-Consolidated paper mills in Grand Falls and Stephenville, the Corner Brook Pulp and Paper Co. mill and North Atlantic Refining

in Come By Chance. The paper mills in Grand Falls and Corner Brook also own significant generation.

In Labrador, the two iron ore operations have their own allocation from Churchill Falls through the Twin Falls Power Company (Twin Co.). In Labrador City, the Iron Ore Company of Canada (IOC) also buys additional power from NLH.

Utilities and Other Generators

Newfoundland and Labrador Hydro (NLH) is a Provincial Crown corporation, with the mandate to generate and transmit electricity in the Province and to provide distribution and retail services to customers in Labrador and in areas of the Island not serviced by NP. It was established[3] by an act of the provincial legislation in 1964 and was incorporated in 1975. NLH owns and operates approximately 80 per cent of the generating capacity on the Island. This includes 900 MW of hydroelectric power and the oil-fired thermal plant at Holyrood (490 MW), which is used on a seasonal pattern according to rainfall. Emergency generation is supplied primarily from combustion turbine units fired with light fuel oil; there is no natural gas available in the Province at present, although a supply of gas from the Grand Banks is anticipated within 10 to 15 years.

Operational Generating Facilities (1999)

	Gross Capacity
Island Interconnected System	
Owned by NLH	
Hydroelectric	899 MW
Oil-Fired	490 MW
Diesel/Gas Turbine	137 MW
Owned by NP	
Hydroelectric	94 MW
Diesel/Gas Turbine	54 MW
Owned by Industrial Enterprises	
Hydroelectric	185 MW
Owned by Non-Utility Generators	
Hydroelectric	22 MW
Labrador Interconnected System	
Owned by CF(L)Co.	
Hydroelectric	5428 MW
Diesel/Gas Turbine	39 MW
Owned by Federal Institutions	
Oil-Fired	7 MW
Isolated Systems	
Owned by NLH	
Diesel	29 MW
Owned by Industrial Enterprises	

NLH is the parent company of a group that includes Churchill Falls (Labrador) Corporation (CFLCo). NLH owns 65.8% of this Corporation, and Hydro Québec owns the remaining 34.2%. CFLCo. owns and operates the 5428 MW Churchill Falls plant Almost all power from this facility is sold to Hydro Québec under a long-term fixed-price contract which expires in 2041. The Twin Falls Power Company (TwinCo.) owns 225 MW of output as compensation for the diversion of water into Churchill Falls from TwinCo's original plant at Twin Falls which is mothballed. This power is used by IOC and Wabush Mines, which own TwinCo. together with NLH.

[3] *Originally as the Newfoundland and Labrador Power Commission.*

Of the 300 MW available to NLH, 170 MW are used to supply power to a number of interconnected communities in Labrador. Approximately 130 MW are currently being recalled and then resold to Hydro Québec at a price close to that of the Québec market.

NLH carries out supply and demand forecasting and long and short-term planning for all the systems in the Province. Since 1996, PUB has had responsibility to ensure that appropriate planning is carried out.

Since 1989, Government policy has been that NLH should avail of the private sector for power generation when the cost would be less than that if NLH were to install additional plants. NLH is currently in the process of engaging the private sector in a significant wind power demonstration project.

NLH has been negotiating with Hydro Québec since 1998 on the sale of power from the development of additional hydroelectric generation on the Lower Churchill River. A total of approximately 2000 MW is contemplated.

Newfoundland Power, an investor-owned utility, is the primary retailer of electricity on the island portion of the Province. It distributes power to approximately 85 per cent of the population. Newfoundland Power purchases 90 per cent of its supply from NLH and generates the balance from its own smaller hydro generating facilities.

Newfoundland Power is a subsidiary of Fortis Inc., which also owns Maritime Electric, the principal supplier of electricity on Prince Edward Island, a 50 per cent interest in Canadian Niagara Power Company, which distributes electricity to Fort Erie, Ontario and through interconnection, supplies the city of Cornwall, Ontario and New York's upstate system. Fortis also has investment in one US generator, two utilities in Latin America, and financial services and real estate.

Industrial Generators

Both Abitibi-Consolidated and Corner Brook Pulp & Paper own and operate hydroelectric generation plants which primarily serve their paper mills. In 2000, agreements in principle were reached with both companies through which NLH will purchase additional power from these companies to supply the general Island system. This power will come from an additional turbine in Grand Falls, refurbishment of the Bishop's Falls plant and a new combined heat and power plant in Corner Brook fueled by mill waste mixed with oil.

Non-Utility Generators

As a result of NLH's 1992 offer to buy power from small hydro generators, two plants now operate, at Star Lake and Rattle Brook. NLH buys their output under contract.

Regulation and Pricing

The industry in Newfoundland and Labrador is regulated by the Board of Commissioners of Public Utilities (the Public Utilities Board or PUB). The *Electrical Power Control Act 1994* (EPCA) directs the PUB to implement Government policy in relation to the electricity industry and describes the policy. PUB regulates both NLH and NP.

The *Public Utilities Act* directs the PUB on the specific methodology to derive rates, allowing an appropriate rate of return on a rate base of allowed costs. The PUB determines the allowed rate of return according to financial market conditions. This is essentially unchanged since the PUA was passed in the 1950s.

For customers on the island interconnected system there are rates for domestic service, general service (small, medium and large), street and area lighting and "industrial" (direct customers of NLH). In Labrador there are currently different sets of rates for each of the towns of Happy Valley-Goose Bay, Labrador City and Wabush, but under NLH's current rate application, these are proposed to be changed to one set, similar in structure to Island rates. Actual rate increases would be phased in.

There is a separate rate structure for isolated communities where diesel generation is used. These customers receive each month a first block of power at the same rates as island interconnected consumers. Additional power each month is charged at higher rates. The necessary subsidy is currently funded by all interconnected customers on the Island system except large industrial customers. After the PUB rules on the current NLH application, it is anticipated that a share of the contribution will be assessed to Labrador interconnected customers. However, for now this amount will not be included in the actual rates charged in Labrador.

Supply and Demand

From 1965 to 1990, the electricity industry in Newfoundland experienced a period of rapid growth with Island demand growing from 1000 to 7000 GWh at an average annual rate of approximately 240 GWH or 8.1%. Figure 2 shows the annual energy demand on the Island system and the total energy the system can deliver.

Since 1990, Island demand growth has declined to an average annual rate of about 50 GWh (0.70%). However, these growth rates may be anomalous because of the combined effects of significant industrial load changes, grid expansion and higher than average winter temperatures. The most recent forecast from NLH shows growth over the next 10 years in the order of 100 GWh annually.

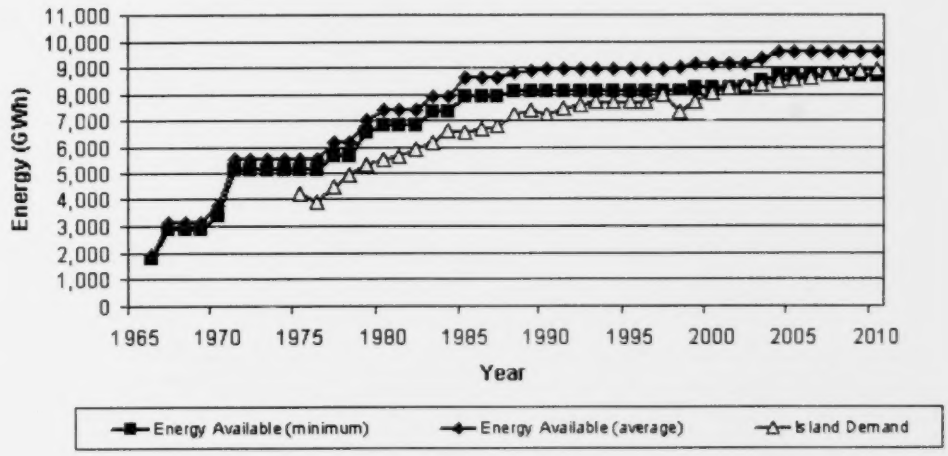
The NLH forecast indicates that the existing plants on the Island system, together with Granite Canal and the new generation to be implemented at the paper mills, should be sufficient to supply needs until 2007 or 2008.

Overall, the Island system functions reliably. Outage frequencies and durations are recorded and reported regularly to PUB with comparisons to average industry performance. Significant deviations from these averages are infrequent. Additional lightning protection has been installed on the main transmission lines from Bay d' Espoir to Sunnyside which was one area of concern because of a series of outages affecting the Come by Chance oil refinery.

In Labrador, there is ample power available from the Province's entitlement from Churchill Falls to meet foreseeable future needs. However, upgrades to the transmission system to both Labrador West and Happy Valley - Goose Bay would be required if any major new demand arises.

Despite the continued northern cod moratorium, some growth is occurring in remote communities. However, the investments required for diesel generator units are relatively modest. Since the cost serving these communities collectively represents a disproportionate amount of NLH's total cost, relative to the number of customers, it is imperative to continue to seek alternatives for their power supply, whether from new generation options or interconnection opportunities, whenever this offers the prospect of reducing the cost of supplying this power.

Figure 2: Island Interconnected System Energy Delivery (Actuals to 2000, NLH Forecasts 2001 - 2010)



Part 2: Structural Reform

Historical Trends in Electricity Industry Structure

In most areas of the industrialized world, electrical utilities originally were localized, providing all the functions within a limited geographic area - they were small, 'vertically-integrated'. As power use grew rapidly and energy intensive industries developed, these small organizations proved both inefficient and often incapable of financing the large central generating plants which were then the most economical way of producing power.

In some places, the solution was to force the small utilities to combine, often through government, at the national or provincial level, taking over much or all of the industry.

Other jurisdictions, notably certain states and regions in the United States, moved in another direction. Small utilities retained their local service areas, but gave operational control of their generators and transmission systems to a jointly-owned organization which could function to reduce overall costs and facilitate the joint ownership of large generating plants. This is the power pool model which prevailed in New York, New England and other areas for much of the 1980s and 1990s.

In a power pool system, the pool operator collects tariffs from generators or their customers for use of the transmission system, from which it pays its own relatively small costs and returns the

Many countries, states and provinces have reviewed and restructured their electricity industries in recent years. This process generally begins by examining, in the context of the unique attributes of each system, the primary functions which must be carried out by the industry. These are:

- Generation
- Transmission
- System Operation
- Distribution
- Retail.

These functions have been separated, analyzed and recombined in various ways to produce a range of industry models seen today around the industrialized world.

Generation	the production of electricity from steam (thermal generation made by burning fuel such as oil, gas or wood), from harnessing water power, from harnessing wind power, or by various other means.
Transmission	the transportation of electricity from generating stations to main terminal stations on high voltage lines (usually from about 60,000 volts upward).
System Operation	the control of the generation and transmission system, including the ordering of generators to operate or not, according to the anticipated demand. In competitive markets such as New England, this is done according to price bids. In markets such as the Island of Newfoundland, it is done in such a manner as to minimize cost. It may include future planning.
Distribution	the delivery of power from transmission terminal stations over lower voltage lines from main terminals to end-users.
Retail	the customer service functions for end-users, such as metering and billing. In competitive retail markets it also involves sophisticated power purchasing activities to reduce costs and the pricing and advertising of creative packages to attract customers.

remainder to the transmission owners to cover their maintenance and debt costs.

Today in the electricity business, the trend is towards using competition to ensure that customers are served at appropriate cost, rather than regulation. Competition is being introduced in both generation and retail, either simultaneously or with the creation of competitive generation preceding competition in retail.

Competitive generation markets (also called competitive wholesale power markets) are similar in basic structure to power pools, except in the manner in which the system operator decides which generators to have operating at any given time. Instead of using a list of lower to highest cost generators based on actual cost data, generation owners bid the minimum price at which they are willing to supply power. The operator then ranks these price bids and, starting with the lowest, orders enough generators to operate to supply the need. This process is repeated usually in one-hour or even half-hour blocks. **All generators running in a given time block receive the highest price bid by a generator which is ordered to run.** This is called the clearing price.

This type of market is called a spot market. In most places where it operates, it actually supplies a relatively small portion of the total market. Behind it is usually a private, confidential market in bilateral contracts between generators and customers (distributors, large users, power marketers, etc.) through which greater revenue or cost stability is achieved. A notable exception to this has been California, where utilities supplying end-use customers were strongly discouraged from entering into long-term contracts for power. Many observers put significant blame for the problems experienced in California on this difference.

Unless companies which supply power to end-use customers have the ability to buy power from different suppliers at different rates, the concept of retail competition is effectively meaningless. Most of the end user's price comprises the cost of power from the generation level, plus the cost of transmission and distribution. Without competition in wholesale supply, the differences between retail competitors will only be in other factors, such as the ability to combine electricity bills with other services, such as telephone or cable service.

Transmission and distribution, are often termed the 'wires business'. This has remained a monopoly in the electricity business. To have duplication of transmission or distribution lines is inherently inefficient. There has, however, been change in the wires business in many places. This has been the separation of these functions from the other industry components (generation and retailing) and the separate estimation of their costs and regulation of the prices charged. This is called unbundling.

The separation has sometimes been achieved by the handing over of control to larger regional entities, as in the power pool arrangement, or by introducing 'business unit' separation within a large integrated utility. This is the case today in Québec for example, where TransEnergie is a division of Hydro Québec, responsible for transmission.

Similar changes have been made at the distribution level in some jurisdictions, where retail competition has been introduced.

All of these types of changes presented a wide range of possibilities to consider for the future structure of the electricity industry in Newfoundland and Labrador. With the significant assistance of Hagler Bailly Canada and its staff with experience in electricity restructuring around the world, four models were developed as options for the future basic structure of the provincial industry. These models are:

1. The Current Model - status quo;
2. The Composite Model - modified status quo;
3. The Single Integrated Utility Model;
4. The Competitive Generation Model.

The Current Model - Status Quo

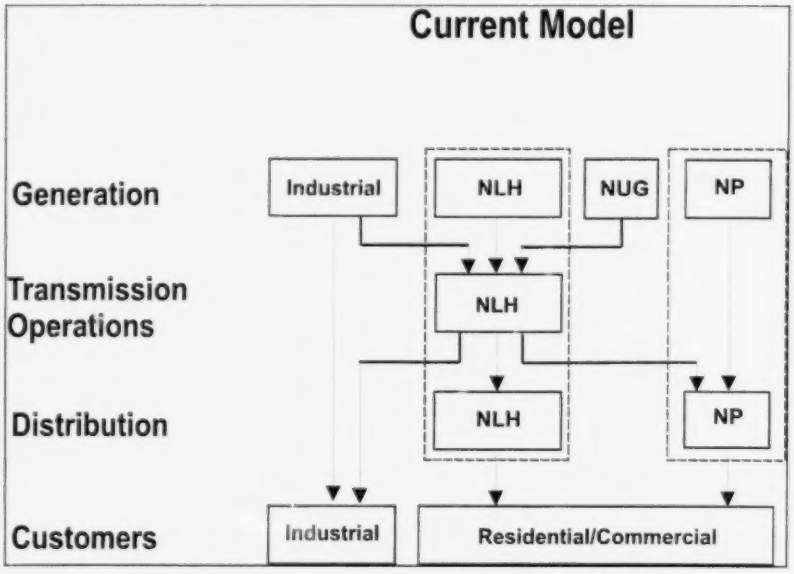


Figure 3: Current Model

Clearly, the current industry structure works, in the technical sense. Electricity is delivered reliably to all residents. Large-scale investment errors, such as the construction of significant excess capacity, or the employment of inappropriate technology, have not been made. Industry employment is approximately 1800 and this number has been gradually falling as the utilities seek efficiencies in their operations to control costs.

Partial solutions for three of the significant issues identified (the accountability conflict, the selection process for new projects and the duplication of distribution and retail services) could be achieved without structural reform.

The accountability conflict could be addressed by removing PUB's authority over NLH, or at least some aspects of its operations, but the problem would remain of setting rates. Alternatively, of course, government could take a completely "hands-off" approach to NLH.

The additional cost incurred by customers due to the duplication of distribution and retail services on the Island was previously identified in the early 1970s and again in the early 1990s. One option to resolve this issue and achieve the potential efficiency gains would be to transfer NLH's Island distribution and retail operations to Newfoundland Power.

A solution to the issue of the project selection process without structural reform is difficult to find. Creating the situation where an independent agency has the knowledge, data, expertise and tools to evaluate projects may be possible, but it would mean significant duplication, since these same elements are also needed by NLH for its role as operator of the main generation and transmission system. Such duplication would be inefficient. Oversight by Government could be implemented, but uncertainty over how fair the process and results are, would probably continue. The remaining significant issues (i.e. regulatory reform and future generation) are not directly related to the industry structure.

The Current Model: Summary of Advantages and Disadvantages

The main advantages of the status quo are:

- No expenditure of money or effort on structural changes;
- Possible, but not ideal, to address some major issues through legislative and regulatory reform;
- NLH retains responsibility for overall system planning, to ensure power reliability and quality;
- Possible to realize some cost reductions/operating efficiencies if the distribution and retail functions were carried out by one entity.

There are also disadvantages. These are:

- Ongoing difficulty and/or inefficiency in implementing a selection process for new generation which allows NLH projects to be considered, yet is demonstrably fair to private sector bidders;
- Having enacted full PUB authority over NLH in 1996, even its partial removal may be negatively characterized by some as a reversal.

The Composite Model - Modified Status Quo

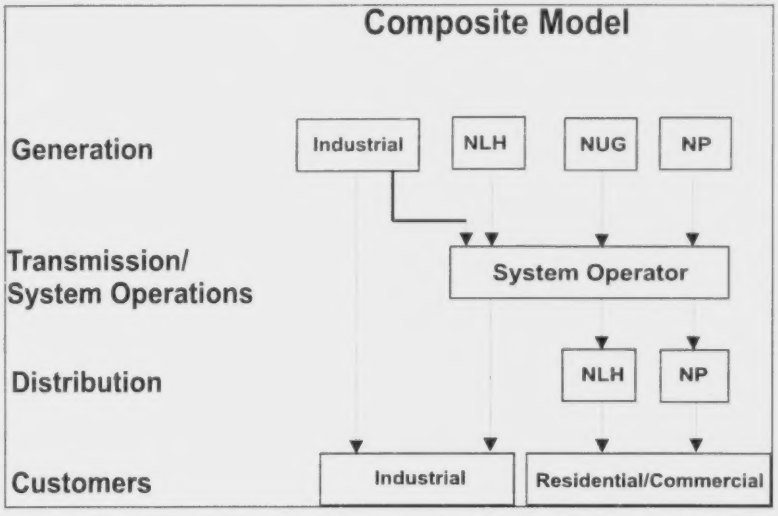


Figure 4: Composite Model

Department review of the models suggested by Hagler Bailly, other provincial structures and previous studies on the Provincial industry structure led to the formulation of a composite model for the industry structure. This model draws upon the power pool concept, together with elements from more recent developments (such as have occurred in Québec) which appear to have merit.

In this model, the system operation function is separated from the ownership of generation and transmission to produce a system similar to the power pool structure. As such, it is a proven model in other jurisdictions. The restructured roles in generation and transmission functions envisaged would be as follows:

- A System Operator would be created using some of the physical and human resources of NLH and NP. NLH and NP would give control (but not ownership) of the necessary wires network and associated control systems to the System Operator.
- The System Operator would be a Crown agency (Commission or Corporation)
- The output from all existing NLH generation would be purchased under power purchase agreements (PPA's) by the System Operator.
- The PPAs between NLH and the System Operator would likely consist of:
  - one collective PPA for all existing NLH hydroelectric plants
  - one PPA for Holyrood;
  - one PPA for other generation and the ancillary generation services needed to operate the system reliably (these include reserve generation, voltage support and the like).

- The PPA for NLH's hydroelectric generation could be similar in style to that implemented by Québec i.e. a fixed price sufficient to cover anticipated costs, plus a return on investment, with no upward review except under very exceptional circumstances.

- The System Operator could purchase the output of NP's generation under a similar PPA.

- Existing PPAs between NLH and non-utility generators would be transferred to the System Operator.

- The System Operator would also have PPAs with industrial generators for any excess power they generate.

- The System Operator would order the various generators to operate according to criteria designed to minimize costs, while meeting contractual obligations (currently, NLH does this with its own generators plus those non-utility generators with PPAs).

- The System Operator would be responsible for system planning and for administering a competitive process for new generation contracts. NLH would be free to bid, as would NP and the general private sector. Since the System Operator would not own assets, it would be independent of all generation owners in this regard.

- NLH and NP would be responsible for debt payments, maintenance and physical operation of all their respective assets. Generation owners would be paid through contracts according to their units' operations. A regulated transmission tariff (most probably a "postage stamp" type) would be collected by the System Operator. It would pay the System Operator's operating costs and the transmission owners transmission-related maintenance and debt costs. This tariff could be regulated by PUB.

In this model, the accountability conflict for the NLH Board and Executive could be readily resolved. The remaining activities of NLH, which would no longer include the planning and new generation selection, could be carried out more at arm's length from Government. These are the areas where government policy is more likely to diverge from the commercial activity of the corporation. There would be a need for setting the rates in the PPAs between NLH and the System Operator, but these could be primarily one-time exercises, with occasional resetting as circumstances dictate. Overseeing this process could be assigned to PUB without resulting conflict for NLH.

In order to avoid transferring the accountability conflict to the System Operator, it would be necessary to organize its oversight appropriately. Since it would own few assets, it could be a non-profit enterprise with PUB regulating the transmission tariff. This is a commonly used arrangement. Government, as owner of the System Operator, would take responsibility for oversight of the planning and system development aspects, using whatever level of ongoing consultation with stakeholders it considers appropriate.

Setting the rates at which the System Operator sells power would be a critical element. Consistency with current practice would suggest that the PUB should do this, but without its current authority over planning decisions.

Reducing overlap and duplication in distribution services could be addressed in the same manner as described previously in the status quo option.

The Composite Model for a Modified Status Quo: Summary of Advantages and Disadvantages

This model has some significant advantages over the status quo:

- The model offers a significant solution to the current situation where there is potential conflict of interest where NLH is both advancing its own projects and selecting new generation and transmission projects;
- The model would allow NLH to operate more on an arm's-length, businesslike basis, with the Board of Directors having both authority and sufficient responsibility to operate the corporation to meet financial performance targets;
- Government oversight of the system planning and control functions and the system's role in economic development could be achieved through the System Operator;
- The existence of a regulated transmission tariff would significantly facilitate the use of the transmission system for wheeling by industrial or independent generators to larger customers or affiliated corporations which would encourage diversity and the activity of the private sector;
- It would reduce the regulatory burden if setting the PPA prices for existing generation were done as a once-only exercise, with a formula adjustment to cover fuel cost variations, except under extraordinary circumstances;
- The rationalization of distribution activities between NP and NLH would still be possible.

There are also some disadvantages:

- Its implementation would be somewhat complex and require some legislative change. A significant amount of effort would be required from NLH and NP to establish the detailed plans necessary for implementation;
- It may create some duplication of corporate support functions as the System Operator would require support services such as Human Resources and Information Technology. This could be mitigated by allowing common support between NLH and the System Operator for an interim period.

The Single Integrated Utility Model

The single integrated utility model is quite straightforward. One utility performs all the functions required. Many Canadian provinces, as well as other countries or their regional jurisdictions, took steps to create large, single utilities. This was necessary in order to create corporations large enough to support the huge central power stations which could offer economies of scale as power use grew dramatically in the second half of the twentieth century. A similar process occurred in Newfoundland and Labrador with the creation of NLH, but the purchase of all existing generation and of the distribution did not occur (NP's predecessor private utility retained the majority of distribution and some generation).

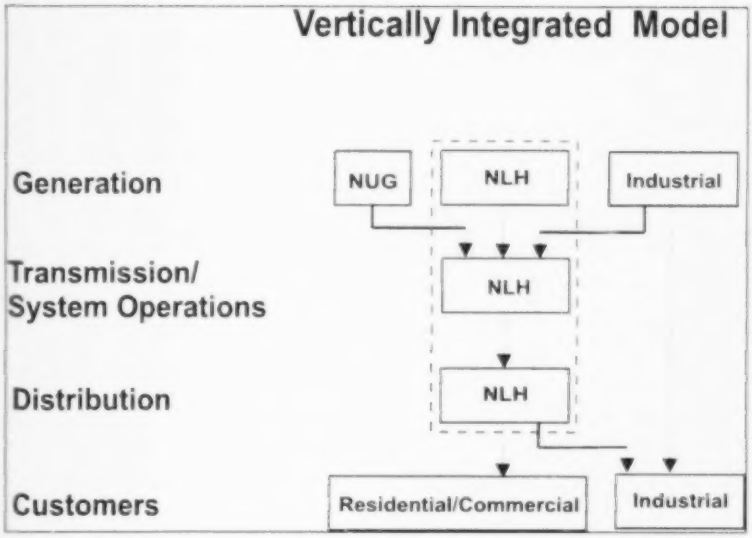


Figure 5: Single Integrated Utility Model

One single integrated utility does potentially offer the most efficient structure to provide electrical service. There is no need for duplication of functions nor for external transactions for power requirements.

Many suggest, however, that large organizations with a total monopoly do not achieve optimal efficiency. Efficiencies are difficult to achieve because there is no competition. Management may tend towards maximizing capital investment in order to provide 'growth', even if that is not an ideal solution. External regulation is supposed to prevent such occurrences, but given the reliance regulators must place on the utility itself to provide data and information, regulation is a difficult task under these circumstances.

This is not to suggest that this has happened in Newfoundland and Labrador, nor that it would happen if a single, large utility were to be adopted as a future structure.

Since Government specifically stated that privatizing NLH is not under consideration in this policy review, the only route to the creation of a large, single utility structure is for NLH to acquire Newfoundland Power. However, there is no trading in shares of NP, only in its parent company Fortis Inc. Unless Fortis were willing to sell its largest subsidiary, NLH would need to purchase the

shares of Fortis, then dispose of the other assets. Fortis Inc.'s 2000 Annual Report indicates total asset value of approximately $1.48 billion, with long-term debt of $728 million.

As a provincial Crown corporation, it would likely be considered inappropriate for NLH to continue to hold Fortis assets other than NP. Potential buyers knowing that NLH would have a strong desire to sell would weaken NLH's negotiating position. It may be difficult to realize the value which might be obtained under other circumstances.

Another consideration would be the approach to regulation where NLH would be the only electrical utility. Such circumstances may highlight the need for only one final authority, and there would likely be stronger pressure on Government to have PUB fill that role. This would not further the objective of having the electricity industry participate in Provincial economic development.

One advantage of this model is a reduction in fiscal flow out of the Province. Newfoundland Power pays federal corporate income tax ($13.3 million in 2000), whereas Provincial Crown corporations such as NLH are exempt. If NLH acquired the assets and operators of NP, the entire utility operation would have exempt status.

The inefficiencies associated with the duplication of services in the distribution and retail functions of NLH and NP would be removed automatically.

Perhaps the largest potential problem in implementing this model is the cost associated with acquiring the shares of Fortis Inc. Unless the shares could be acquired at the right price (and the extra-provincial assets sold at the right price) this whole exercise may well be uneconomic.

Single Integrated Utility Model: Summary of Advantages and Disadvantages

The advantages can be summarized as follows:

- Removes duplication of distribution services and corporate administration functions;
- Improves ability to plan an integrated system development;
- Removes all liability of electricity industry for federal corporate income tax, assuming NLH acquisition of NP.

The disadvantages are:

- Significant short-term expense and effort for NLH to acquire NP, with associated complications concerning the parent company, Fortis Inc;
- Potential to make the accountability conflict more acute, unless Government is willing to allow full autonomy to NLH.

The Competitive Generation Model

As previously indicated, unless wholesale generators are competing one with another, there is essentially no potential for competition to supply energy at the retail electricity level. Consequently, in examining the possibility of introducing competition, the policy review focused on the wholesale level.

Competition in this model should be understood to mean ongoing competition to generate power in relatively short time blocks. This model is not about competitive bidding for long term contracts. That form of competition could be incorporated into other models.

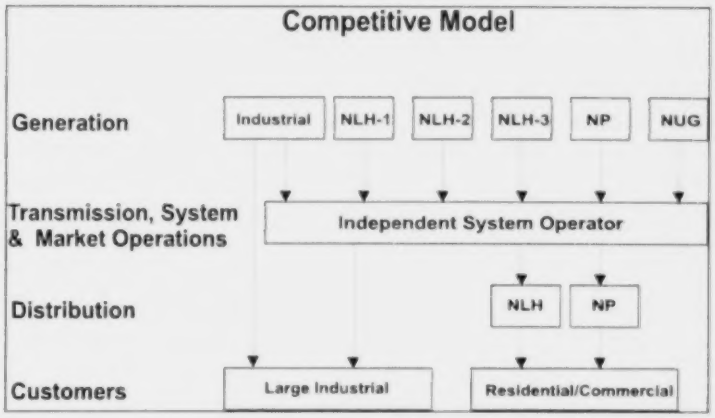


Figure 6: Competitive Model

Proponents of competition suggest it is a better method of obtaining power at fair cost than is price regulation. Economic theory suggests this is true, but only if the competition itself is fair, no single participant can control the market and no collusion occurs. To achieve this, evidence suggests at least four or five independent generation owners are needed, with none controlling more than half the total generation; a maximum of 35% control is preferable.

Hagler Bailly explored this option in the context of Newfoundland and Labrador in depth. The conclusion was that it is technically possible, but only if the generation operations of NLH were 'broken-up' into business units which would subsequently compete both with other generation owners (Newfoundland Power, the paper mills, existing and new independent power producers) and against one another. The need for this arises from the dominant position of NLH in the Island generation sector.

Hagler Bailly also considered general size of the implementation costs of the model. A market operator and a system operator would be required, along with transfer of control of transmission network.[4] While the system operator could utilize personnel and physical assets from NLH, the market operator would be completely new. Furthermore, the generation owners would each need

[4] *These could be done within one entity, but the requirement for the separate functions would remain.*

personnel to carry out the market-related functions. All this would create extra costs that market participants would need to recover from consumers in order to remain viable.

Other difficulties were also foreseen. With a system which is mostly hydroelectric, a sequence of dry years would leave the oil-fired station at Holyrood in a dominant position much of the time, and the business unit controlling Holyrood could bid up the price to increase its profits. Even without low-water conditions, this would be a likely scenario for the winter period, when Holyrood is always required to operate to meet peak demand. This would result in all generators receiving significantly higher prices and total costs rising considerably.

In many other jurisdictions where this type of competition has been implemented, the overall demand has been forecast to grow significantly in the future. In such circumstances, higher prices encourage new investment, which increase the competition and thus lower prices. These types of cycles are typical of competitive commodity markets.

As indicated previously, demand in Newfoundland and Labrador is very modest in the near to medium term forecast. Large numbers of new market entrants would not be expected to materialize, since they would compete against existing facilities which should be able to under-bid them because in most cases their capital is largely paid off.

One variation on this model was reviewed by Hagler Bailly which could address some of the problems of the fully-competitive model. A system operator would be created as above, but existing generation would be engaged through contract. New generators would bid into a pool on a real-time basis for whatever additional power was required, as in a fully competitive market.

This variation shows some appeal in that it secures power from existing generation on terms broadly consistent with those owners faced when building the assets involved. However, because new generation is only forecast to be required in small increments, this market would be very small for quite some time. Furthermore, existing generation is more than adequate throughout most of the year, so new generators would not operate much of the time (assuming, as seems likely, their minimum price would be higher than that of existing plants) so they would need to obtain very high prices at times they would run. Again, this would lead to significant price volatility. Much of the expenditure on implementation cost would also remain.

As previously mentioned, the inefficiencies at the distribution level could be addressed. The regulation of NLH's generation business would not be required, but regulation of the transmission tariff would continue.

In this type of a market structure, Government would have to adopt an arms-length relationship with NLH. Since competition would not work with collusion of any kind between competing generation owners, NLH's generation business units would have to be free to operate independently. This

would remove the accountability conflict, but it would also remove Government's ability to utilize NLH in the public interest.

It was concluded that implementing competition would be very costly compared to the size of the industry, and that even then, the competition would be somewhat artificial, given the level of generation ownership by NLH.

The Competitive Generation Model: Summary of Advantages and Disadvantages

The advantages are:

- When operating properly, the price should represent the true cost of supplying power;
- Regulatory burden is reduced because regulating the cost of generation is unnecessary.

There is also one very significant disadvantage:

- It is unlikely that true competition could be created, because there would be limited "sellers", and one or two of them would potentially dominate the market. Accordingly, prices are unlikely to come down and the wholesale cost of power would fluctuate considerably on a daily and seasonal basis.

Part 3: Regulatory Process and Pricing Reform

The Regulatory Process

The primary problems related to the current regulatory process were described in Part 1 of this report. In Part 2, which presented options for structural reform of the industry, it was indicated that each option has different implications for regulation, primarily with respect to what corporations exist and which of their activities require regulation. This section will describe an alternative to the current process of regulation, which may be applied to any of the industry activities which require regulation in the future.

As previously described, the major issues with current regulation are:

- it is complex and burdensome;
- the quasi-judicial setting makes participation difficult for individuals and small enterprises;
- it provides incentives to utilities to make capital investments in order to increase permissible profits;
- it provides disincentives for utilities, to encourage effective actions by customers to increase the efficiency of electricity use.

Over the last two decades, some other jurisdictions have made growing use of alternative approaches to regulation generically called 'performance-based ratemaking' or PBR. There are numerous variations, but in most cases, there is a 'rate cap' in which utilities are allowed only to increase rates by a given factor, often a portion of the consumer price index. This has the effect of gradually reducing the real rate charged, thus challenging the utility to find continual efficiency improvements.

PBR uses standard accounting measures, such as return on equity, as the regulated measure in place of the 'rate base'. The regulator avoids close inspection of costs and decisions of the utility. The regulator concerns itself with the accounting and financial position and the establishment of a fair profit which has a wider range than in the rate base approach. Commonly, utilities are allowed to increase their return somewhat, provided that extra revenue is shared with customers through rate reductions. The regulator usually pre-determines the level of sharing. This provides the utility with the incentive to increase efficiency, and customers share the benefit.

The primary drawback to this change would be the need to gain public acceptance that the regulator (PUB) would no longer set the actual prices for electricity based on the 'real' costs. However, this may be achieved, if it is understood that prices will come down over time, at least compared to inflation, and that the PUB will still ensure that utilities do not make undue profit.

Both PUB and NP expressed support for PBR in information sessions related to the policy review.

Pricing

Under the current approach to regulation, pricing electricity is a complex task involving the allocation of costs across the different groups of customers, based on the size of the load they represent and other characteristics. In this Province's case, this must be done for each of three systems (Island, Labrador and Remote). This approach prices power to all similar customers at equal rates, based on the average cost of supplying that power, according to the costs allowed as prudent by the regulator.

When the impact of supplying an additional 200 MW to the Island system for the Voisey's Bay smelter refinery was estimated, it was recognized that the average rates of other Island customers would rise significantly if this process were followed. There was pressure from some customers to have NLH charge Voisey's Bay Nickel the full cost of the required new power, which would have been significantly higher than the rates at the time.

This "marginal pricing" approach clearly is attractive for existing customers. However, it would be very unusual in a regulated environment and would inhibit significantly efforts to attract any business which would use power at an industrial scale. Also, unless such an approach were adopted for all new customers, or at least those of sufficient size to require any new generation, it would likely be considered discriminatory.

In some jurisdictions, another pricing mechanism is used is to charge different rates according to the time the power is used. This is more common on systems where large thermal, usually coal-fired, and/or nuclear generators supply the base load. Such generators cannot be readily operated at varying levels, nor can they be shut down for short periods, so it is beneficial for all parties to try to shift some of the power demand into time periods when it would otherwise be very low, such as overnight.

In the context of a system such as that serving the Island of Newfoundland, which is predominantly hydroelectric with an oil fired generator supplying winter peak, time of day rates make little sense in relation to the cost of generating electrical energy. Any reduction in demand at one time just saves some of the reservoir water, and less oil is used later as a result. The same argument applies to seasonal rates.

There is one aspect of time of use pricing which must be considered in our system. This is the "demand charge" which is applied to industrial and medium and large commercial customers. It is partly to cover the infrastructure costs associated with serving these customers and is higher in winter to reflect the fact that additional generators, transmission and distribution lines are needed on the system to cover the winter peak demand. However, these charges are quite onerous for some customers, particularly seasonal operations with high demand rates for short periods. The current demand charge structure discourages this type of use because the system must be ready at any time to supply such a customer, but the rates do not provide any incentive for the utility and the customer

to agree that the customer will reduce his demand at normally high demand times, because relief from the demand charge cannot be offered.[5] There may well be significant savings possible for some customers if flexibility were allowed to adjust demand charges according to the customers' specific circumstances and undertakings. Since this would have to be done on a case-by-case basis, it is not something that the PUB could readily address. However, the necessary flexibility could be provided within a performance-based regulatory (PBR) system as described previously.

Other pricing-related matters could be positively affected by changing to PBR. A PBR system may be more effective at providing appropriate incentives when the utility concerned has control of all the cost components involved. This could be achieved by splitting the customer bill into two parts, a commodity charge for the power used and a 'delivery rate'. The change would be similar to having the distribution activity priced more like a trucking or courier company instead of a retailer. It is called 'unbundling'. This is a practice which is increasingly commonplace in both the electricity and gas sectors.

Newfoundland Power at present provides 'bundled' service. NP purchases over 90 percent of its power from NLH, at rates set independently by PUB. In order to then set NP's rates, PUB must approve NP's estimates of sales, then divide expected sales by the allowed costs (including profit) to get the rates, for each customer class.[6]

There would be several advantages to unbundling NP's services. NP would control all the costs associated with its delivery rate which would be set on a cost of infrastructure basis rather than per unit of electricity sold. This is more aligned with the manner in which NP's costs are incurred, since if a householder uses a bit more or less power, there is no effect on NP's costs, other than purchasing that power from NLH. Under this approach, PBR would be more straightforward to implement for NP and improved efficiency should result in a reduction in NP's costs, with the resulting benefit shared between NP's shareholders and customers.

Another advantage is that NP's profits would not be adversely affected by reduced energy use. The Company could promote greater energy efficiency or implement other demand-side management measures without reducing its profits and thus allow it to make a greater return while providing reduced rates. These types of measures benefit all customers by allowing deferral of new generation investment and the need for increases in the electricity cost.

There is one disadvantage with the unbundled approach to pricing. It is likely that small users of electricity (apartment dwellers, cottage owners) would face increased total cost, whereas high level

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5 *There is a "curtailable rate" in effect for one large customer whereby the utility pays the customer in order to be able to request usage reductions, but demand change flexibility refers to routinely scheduled undertakings by customers to limit consumption.*

6 *This is the basic process. There are numerous complexities involved in allocating costs between customer classes (residential and small, medium and large commercial).*

users such as homeowners with electric heating would see decreases. This would occur because a higher proportion of the total cost would be fixed. This does reflect the reality of the cost of providing service. Impacts could be minimized by phasing in changes to the current system and by varying the delivery charge with the size of the service installed, which would be appropriate.

Finally, the matter of NP rate applications being required solely as a consequence of an NLH rate change would be removed.

Summary of Advantages and Disadvantages

The advantages of PBR and unbundling are:

- reduced regulatory burden;
- incentives and improved ability for utilities to improve efficiency;
- decoupling distribution charges from actual electricity use and consequent ability of distribution companies to control costs;
- better able to promote energy efficiency amongst customers.

The disadvantages are:

- need to gain acceptance to change to indirectly set rates;
- need to refine unbundling to protect small users.

Part 4: Future Generation Sources

In order to present discussion of policy options regarding future generation, it is necessary to use again the terminology of peak demand and annual energy. The description of these is repeated in the box text for readers who are unfamiliar with these terms.

Power and Energy

In any discussion of electricity supply and demand, it is important to distinguish between the ***rate*** *at which* ***power*** *can be generated (or the rate at which it is used) and the aggregate of all generation* ***over time****, which is the* ***energy*** *used.*

The system must have sufficient generators to be able to match the highest rate of power use expected. This is called the peak demand and, like the size of individual generators, is measured in Megawatts (MW). In addition, the system must have enough units to cover an unexpected breakdown at the time of peak demand.

The system must also be able to supply all the electricity customers use throughout the year. This amount is the energy requirement and is measured in multiples of watt-hours - for example, the kilowatt-hours shown on a residential bill. To avoid constant repetition of millions, billions, etc., we use larger units where appropriate.

1000 kilowatt-hours = 1 Megawatt-hour (MWh)

Estimating future power needs is more complex than simply adding the cheapest new plant. Other considerations must be taken into account, including:

- does the system need additional energy, or just extra generation to meet forecast peak demand?
- over what time frame should we calculate 'lowest cost', bearing in mind that forecasts of power needs tend to be less accurate over the longer term?
- can the system handle more generation from plants like wind farms, which cannot be ordered to operate at a given output level?
- what will be the future environmental constraints on generation?

These considerations indicate that it would be extremely difficult to estimate the impact of ruling out **by policy** any particular generation type. In order to create a plan for future generation which meets all the criteria of the day at the most affordable cost, any potential source of power should potentially be available for consideration. If that is not the case, policy may have ruled out the best options.

When the policy review process was announced, a moratorium on new, small hydro projects was implemented until the process was complete. It must be concluded that a permanent moratorium on all small hydro could potentially result in increased costs to electricity consumers in the future, given recent experience with oil and gas prices and possible future constraints on emissions from fuel burning.

Furthermore, a permanent moratorium on any source of power is inappropriate as an energy policy component. From this perspective, developers should be free to propose any project. If a project

can meet the demands of environmental impact assessment **and** is selected as being the most desirable project to meet the system's requirements in terms of cost and technical characteristics, it should be developed.

Following is a summary review of the sources of electrical power available to the Province. Most of these would be considered for the Island system, because of the availability of Churchill Falls power in Labrador, with other Churchill River developments available for export and/or use in the Province.

Large-Scale Hydroelectric

Although many of the larger hydroelectric sites on the Island have been developed, there are at least 20 potential hydroelectric sites on the Island greater than 20 MW, with a total capacity of over 1200 MW. Many of these might be judged environmentally unacceptable at present, but nevertheless they do exist and must form part of the inventory of sources. Some of these sites are on rivers controlled by the paper companies, while others are on undeveloped rivers. Two are within the Bay d'Espoir system.

Large-scale hydroelectric plants provide both energy and peaking power, provided they include a reasonable reservoir.

Large hydroelectric plants are expensive to build, but very cheap to operate. They have no direct emissions of pollutants, but do flood large land areas with impacts on fish, wildlife and humans. There are some emissions of methane (a greenhouse gas) but these are minor in our environment compared to the greenhouse gas emissions from burning fossil fuels.

Small-Scale Hydroelectric

In 1990, Government adopted policies to encourage the development of private sector small-scale hydroelectric projects up to 15 MW. This policy was amended in 1997 to remove the 15 MW restriction.

A Request for Proposals (RFP) for small hydro was issued by NLH in 1992. Twenty-six projects were submitted. Four proposals were selected for development, including Star Lake (15 MW), Rattle Brook (4 MW), Northwest River (12 MW) and Southwest River (7 MW). Star Lake and Rattle Brook are completed and in service. Northwest and Southwest River projects were classed as environmentally sensitive and subsequently not pursued. Three other projects, Northwest Brook in Garia Bay (15 MW), Northwest Arm Brook in Connoire Bay (15 MW) and Torrent River (27

MW) were submitted under this RFP and also again in response to NLH's 1997 RFP[7]. Proponents of these projects continued their environmental impact studies. Garia Bay was released from the environmental assessment process in 1998, while the other two have yet to complete the process. Nevertheless, proponents spent considerable funds on studies and evaluations.

A study carried out in 1986 indicated a total potential of 710 MW of possibly cost-effective small-scale hydro on the Island. There is also hydro potential in Southern Labrador, but to date transmission costs to and between communities have made its development uneconomic.

Small hydro plants share the advantages and disadvantages of large scale systems, except that flooding is usually less in proportion to their output. However, most small systems can offer only energy and do not contribute to meeting peak demand, because they rely on the natural river flow and usually have no (or very little) reservoir storage. There are exceptions to this; even "run-of-river" projects could be partially included in system capacity calculations, after a good operating history is established.

Large Thermal Generation

Conventional thermal generation burns oil, gas or coal to make high-pressure steam, which turns turbines connected to generators. There is only one large plant of this nature in the Province at present. This is NLH's 490 MW facility in Holyrood.

In principle, large-scale thermal generation is unlimited and can be sited in any location with the appropriate characteristics. In practice, concerns over local or regional impacts from emissions or fuel supply issues limit the choice of locations. Nevertheless, if such plants are chosen in the future, there would likely be numerous sites to choose from.

The Holyrood site can accommodate one additional heavy oil burning unit, similar to the three existing ones. It can also accommodate a new-technology combined cycle unit[8] which would run on cleaner light fuel oil or potentially, in the future, natural gas.

The existing Holyrood units could be converted to burn natural gas. This would considerably reduce the plant's impact on the area. However, gas is not currently available in the Province, although resource estimates for the Grand Banks are in the 5 trillion cubic feet range. Over the last eighteen

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7 *The 1997 RFP was issued by NLH to obtain private sector proposals in relation to providing 200 MW of new generation to the Island system to meet the requirements of the Voisey's Bay Nickel smelter/refinery.*

8 *A combined cycle unit is one or more combustion turbines (large jet engines) each with a generator attached, together with a steam turbine generator unit which uses the waste heat of the combustion turbine exhaust gas to make the steam. Whereas traditional units have a maximum efficiency of about 35%, combined-cycle units can turn fuel into electricity at up to 55% efficiency. Continued development may increase this in the future. Most of the new generation planned in the US consists of combined-cycle units fueled by natural gas.*

months, the Provincial and federal governments, together with the petroleum industry and the Newfoundland Ocean Industries Association, have studied the prospects for the development of Grand Banks gas. The relevant finding was that because much of the gas discovered to date is associated with oil being or to be produced, it is unlikely that sufficient gas will be available to support development until at least late in this decade. As that time approaches, decisions will be required on whether it is best to refurbish or replace the Holyrood units in order to generate power from gas. These decisions must be made based on the prevailing circumstances at the time.

Coal-fired generation has been evaluated by NLH in the past. Coal has a more stable price compared to oil, but the cost of imported coal, the infrastructure costs for handling coal and the relatively heavy emissions from coal burning have made it uncompetitive compared to oil.

There is renewed interest across North America in coal burning. The US expects to spend considerable research funds to develop workable "clean coal" technology. Coal should be re-evaluated periodically as prices and technology change.

Thermal generation is often cheaper to build than hydroelectric plants, but it incurs higher operating cost and the economic life is shorter. Emissions can be a problem which is costly to address. Possible constraints on greenhouse gas emissions are a threat to the economic competitiveness of thermal generation.

Wind Generation

During the past five years, several proponents have indicated a desire to pursue wind generation projects on the Island portion of Newfoundland. Some proposals have been submitted in response to NLH RFPs for new generation sources, while others have been unsolicited.

The cost of many other forms of generation is increasing, but significant cost reductions in wind generation, the widespread use of wind generation elsewhere and Federal Government initiatives to encourage development of small renewable energy generation sources, prompted the Department of Mines and Energy and NLH to revisit the issue. In 2001, NLH issued an RFP for a two-stage Wind Generation Demonstration Project. The work was awarded to the NeWind Group. The project is designed to determine the effectiveness and viability of wind power in our environment, in order that wind may be appropriately included in future planning.

In the first phase of the work, NeWind will collect wind data at a number of locations, investigate other aspects of potential sites, such as environmental impact, land availability and the likely impact of icing on wind turbines. From that work it will prepare a feasibility study for NLH, including proposed prices for power from a wind farm. The study will include a range of prices based on wind farms between 5 MW and 25 MW.

Following submission of the feasibility study and assuming a positive outcome, NLH will negotiate with NeWind to select the final project configuration and price. The negotiations will balance the total cost of purchasing power against the price per unit of power, which is expected to be lower in the case of a larger project. Any potential offsetting income to either party will be taken into account, such as a "green power" price premium, which the federal government pays in some other provinces.

Newfoundland and Labrador Hydro will not invest any capital in this project. The NeWind Group will be responsible for financing, building and operating the wind farm and will only be paid for power it produces.

It is anticipated that the output from wind turbines in Newfoundland will be higher than the average obtained in many other areas, due to our high average wind speed. If correct, this will reduce the cost of wind power and increase its competitiveness. However, Newfoundland has higher than average icing conditions, which may offset this advantage to some extent. The NeWind project will, if it proceeds, provide some significant data on this subject.

There will be a limit, however, to the share of total generation which comes from wind combined with other sources which are not dependable at any given time, due to their intermittent nature. As experience with such sources increases, it may be possible to add more, but initially the limit may be in the order of 10% of the total system. The reason is the need to ensure at all times that the system can operate reliably, even in the event of sudden breakdowns of large generators.

The advantages of wind power include its renewability, its lack of emissions and other pollution and, possibly, its price.

Balanced against these are disadvantages, including its intermittent character, high visibility (modern wind turbines are based on structures up to 50 meters high and have blades up to 40 meters or more in diameter), some noise and potential impacts on birds (although this last point may have been worse with older technology and can be minimized through choosing appropriate sites).

Thermal Generation from Biomass

Three forms of biomass are available in the Province: wood, peat and waste. Programs to encourage biomass use existed from 1978 to 1995.

Wood

Wood burning had some success for a while in Newfoundland and Labrador, principally in the larger health care institutions. The period of generally lower oil prices in the late 1980s and 1990s reduced its economic benefits significantly.

NLH had a 5 MW wood-fired generating facility in Roddickton, built when the Great Northern Peninsula region had an isolated system supplied primarily by diesel generation. With interconnection to the main grid, the wood plant became uneconomic and was written off as an asset by NLH in 2000.

Wood's main advantage is that it is a renewable energy source. However, given the cost and the general Island shortage of wood, it is unlikely that this fuel has much future for large-scale generation. Opportunities do exist for the use of wood waste for cogeneration at industrial facilities in the forest products sector. Both Abitibi paper mills may be able to implement cogeneration based on mill waste for increased steam production combined with generation, as is done in Corner Brook. The same applies to any sawmill which has drying kilns. A technology development project for small-scale turbine generators using wood fuel is underway involving Newfoundland sawmills and NRCan.

Peat

Newfoundland has very large peat resources, but peat requires atmospheric drying before it is suitable for fuel and our climate is less than ideal. Artificial drying at an affordable cost remains, for now, an elusive prospect.

Studies have indicated that peat could be cost-effective for generation, but the harvest level would be subject to uncertainty from year to year. Also, the acceptability of the environmental impact of large-scale peat harvesting remains to be tested in this Province.

Waste

The burning of municipal waste for heat and/or generation is widespread in Europe where landfill opportunities are more limited. Evaluation in the early 1980s indicated that it would not be economic here until the St. John's area required a new landfill site.

This remains an option that should be re-evaluated as part of any Avalon region integrated waste management program. In other areas, the waste stream is too small for power generation.

Waste may also include industrial by-products. "Sludge" from paper mills is the primary source in this Province. Sludge can be used as fuel, in a similar manner to wood waste, as described above.

Cogeneration

Cogeneration is the simultaneous generation of power and useful heat from burning fuel, which can be any of the fuels previously described. With cogeneration, optimal use of the total energy content of the fuel can be made. In 2000, NLH signed an agreement to purchase power from a 15 MW cogeneration project at Corner Brook Pulp and Paper. The system will burn mill waste and oil.

There is also additional significant cogeneration potential at the Come By Chance refinery and as previously noted, the Stephenville and Grand Falls paper mills. However, the economics of this are up to the facility owners to evaluate.

Fuel Cells

Fuel cells are a developing technology which shows promise of wide application. At the most basic level, fuel cells are fed with hydrogen and oxygen. Inside the cell, these elements combine chemically (no burning) to form water. In the process electricity is produced.

For most practical applications, it is likely that a fuel containing hydrogen (e.g. natural gas, propane or alcohol) will be used with the hydrogen being extracted for the fuel cell as required.

Fuel cells are anticipated to be a major innovation for vehicles, but two electric power-related applications are also under development. These are utility-scale fuel cells, which to date are up to 0.25 MW, and small units which can be placed in a residence or commercial property to provide electricity and heat. Some supporters of this latter application suggest that transmission and distribution networks would become obsolete. Although demand may be significantly reduced if and when such devices are available, it is unlikely that they will disappear.

This technology is still in the development stage.

Solar Power

Electronic assemblies called photovoltaic (PV) panels generate power directly from sunlight. Like wind power, technology development has reduced the cost of power from these devices over the last 10 to 20 years, but it remains higher than most other generation technologies.

PV generation is completely clean and silent. Its disadvantages, other than cost, are that it does not operate at night (so it requires storage or alternative means of generation), output is reduced in cloudy or foggy conditions, large numbers of panels are required for even modest amounts of power, and the panels have to be kept clean and free of snow and ice.

Nuclear Power

At present, there is a policy prohibition on nuclear power in the Province in the *Electrical Power Control Act*. No new nuclear facilities have been built in North America for several years, and most units in service in Canada have suffered from problems maintaining performance. Furthermore, the current minimum workable size for nuclear plants of around 500 MW may be too big for consideration as a source of new generation for the Island system's rate of growth.

As technology development continues and if societal opinion changes concerning the relative risks of nuclear power (such as leaks and the management of radioactive waste) compared to its benefits

of power without air pollution, there may come a time to reconsider nuclear power. However, there appears to be no significant advantage to changing the current policy at this time, even though as a general rule, policy should not prohibit any type of generation.

Improving Energy Efficiency

Adding new generation to the system is expensive. All power from new sources costs more than the average cost of power from the facilities already operating. Yet consumers often use power inefficiently and use it in ways which result in more generation and transmission being required. Measures to increase the efficiency with which power is used and to make more efficient use of the system in place, can often be economically beneficial.

There are many opportunities, from improving insulation levels to installing heat pumps instead of baseboard resistance heaters. On the commercial and industrial level there are opportunities in lighting, ventilation, air conditioning and electric motor improvements. All of these have their own economic profiles by which owners judge their value. What is missing from the equation is the economic benefit of postponing investment in new generation and transmission. This is a benefit to the overall system and therefore to all customers in the longer run.

In the section of this report dealing with electricity pricing, it was noted that NP buys most of its power from NLH, then sells it at higher rates to its customers, in order to recover its cost and earn its profit. This creates a disincentive for NP to maximize its efforts to help customers use electricity more efficiently, because its total revenues will fall if they do so. The economic benefit of widespread increases in efficiency would be gathered by NLH (by avoiding or delaying investment in new power). Unbundling NP's rates into a pass-through charge for power, plus a fixed delivery charge, would help resolve this. Under this arrangement it would be more realistic for NP to implement efficiency programs and other measures to utilize the entire system more effectively, because its profitability would not suffer in proportion to the program's success.

In many jurisdictions, such "demand-side" measures have been identified as a lower-cost alternative to new generation. Previous studies have identified potential here, but if the pricing methodology for electricity were changed as described above, it would be appropriate for the utilities, PUB and Government to revisit this area in detail.

The advantages of demand-side measures are that new generation is postponed, possibly along with new transmission and distribution lines. It causes no pollution or other environmental impact and can reduce consumers' bills.

If the revenue impact on NP is avoided, the main disadvantage may be that it reduces economic activity in the building of new facilities. Overall, however, to the consumers who pay eventually this is more of an advantage.

Interconnection

An interconnection between the Island and Labrador has been identified and pursued periodically since the mid-1970s. The generation cost in Labrador is certainly appealing, lower even for new generation at Gull Island than the cost of any new alternatives for the Island System. However, the cost of transmission remains a significant barrier.

Interconnection with Nova Scotia is also technically achievable. This would provide access to energy to meet annual demand and capacity to meet peak demand needs. It could also provide a route for our Island-based generation to participate in short-term markets if we have an excess on a seasonal basis.

For both these interconnection possibilities, the technology is undergoing continual development. Given that such developments would have a very significant effect on the economic development of the Province, these issues are discussed more in Part 5 of this review.

Generation for Remote Communities

The issue of generation for remote communities has several unique aspects. If it were economic, the best option would be to build transmission lines to them and remove their remote status. However, NLH believes none of the remote communities in the Province can be interconnected at less cost than is required to continue operating diesel plants. NLH regularly re-examines the interconnection costs and compares them to its expected costs for diesel generation, but reports that at present no additional opportunities for economic interconnection exist.

Many people have expressed the opinion that greater use should also be made of other generation technologies, especially renewable energy, to supply our remote communities. However, despite most renewables (such as wind or small hydro) having lower operating cost than diesels, capital cost is a major factor. This is compounded because most renewables depend on nature to supply the energy, which is not reliable. This means that the diesels would still be required for backup, so that the appropriate economic test is to compare the full cost of the alternative with only the operating cost of the diesels. This makes it even more difficult for alternatives to compete successfully. The small size of the remote community systems also makes it difficult to use renewables to supply part of the load, a step that could otherwise help the economics of alternative supply.

However, there are some possibilities for the future. There is some interest in testing small wind turbines , which could be installed on some remote systems. NLH is assisting the interested company in its endeavours.

In the future, there will very likely be commercial utility-scale fuel cells. Although these will likely be designed primarily to operate on natural gas, it may be possible to adapt them to some other fuel such as propane or methanol. Commercial availability of this option is probably some time away and the economics are as yet unknown.

There is also a new technology for electricity storage based on somewhat similar concepts to the fuel cell. This could greatly assist in the ability to use renewable energy in small remote systems, but it is not yet commercially available and the economics are not known at this time.

Part 5: The Role of Electricity in Economic Development

For over 100 years, electricity has played a vital role in economic development in the industrialized world. Without adequate supply or reliable power at affordable prices, modern industrial development would be virtually impossible. In the past, regions where lower cost power could be obtained have been more successful in attracting energy intensive industries.

Today there are new factors involved. With many jurisdictions moving to real-time competition to generate power, combined with the move to open-access transmission, new export markets could be open for projects such as Gull Island. Also, the price instability experienced in some markets has given rise to indications that energy-intensive industries may be placing increased emphasis on price stability, as well as on absolute price.

Finally, there are also indications that new transmission technology may make long-distance undersea transmission more feasible when combined with the market changes that are occurring.

Electricity and Economic Development - The Traditional Approach

The traditional approach is to offer incentive rates to new customers whose start-up in or move to a jurisdiction would create economic development. Reed Consulting (now part of Navigant Consulting) reviewed this approach and its applications in other jurisdictions. Reed found that the trend towards offering discounts to large energy users is on the decline. The reasons for this are recent requirements in international trade agreements against subsidies, the spill-over effects of removing low-cost power from the general consumer supply, thus increasing their costs, and the trend to competitive markets. There is still occasional use of specific low-cost opportunities, but in many cases these are used in short- to medium-term arrangements to facilitate company start-up.

This Province does have opportunities in this form of economic development. Churchill Falls recall power costs NLH very little, and approximately 130 MW could be made available in Labrador. This power is currently sold to Hydro Québec at a much higher price than NLH pays, but it is still low compared to power costs elsewhere. This power is currently being promoted by Government as an opportunity for the development of silica smelting in Labrador based on local resources. Existing large customers in Labrador West may in future also want part of this power.

The picture on the Island is, at present, very different. With the Island system isolated from Labrador and elsewhere, any sizeable new demand means the construction of additional generation, which with the known options would be higher cost than the existing sources and accordingly would mean higher, not lower, rates. To avoid this, it would be possible to require new large customers to pay the full marginal cost of new power, but this would be a disincentive to development and could be challenged as being discriminatory.

As long as the Island system remains electrically separate and without access to a low-cost energy source that can be used to generate power, any proactive role in economic development, such as offering discounted power, would negatively affect other consumers.

What can be done is to ensure that the electricity industry continues to provide reliable power at stable and reasonable prices and that the industry is structured and governed so as to encourage the maximum efficiency and, consequently, lower rates.

Modest initiatives to assist economic development may be justified as being in the wider public interest if the impact is small when spread across all customers. An example of this is the purchase of excess power from industrial enterprises that generate for their own use. As long as the purchase price is reasonable compared to other prices for additional power, this is a mechanism that supports industry at little cost.

Electricity and Economic Development - Power Exports and New Opportunities

The largest obvious opportunity for the electricity industry to play a role in the Province's economic development lies in the development of Lower Churchill hydroelectric power. Government and NLH have been pursuing the Lower Churchill project with Hydro Québec since 1998. However, even with the opportunities presented by higher prices in markets adjacent to Québec and Québec's provision of open-access transmission, it has not been possible as yet to reach an agreement satisfactory to both parties. In addition, the Government of Canada has not agreed to provide the support requested to construct a transmission line from Gull Island to Newfoundland, to provide Island-based consumers access to Labrador power.

There are new developments that may affect this situation. The first is that interest has been expressed on the part of some energy-intensive industries to purchase Gull Island power directly, using some of it within the Province for new facilities. One company, Alcoa, signed a Letter of Intent with the Province and NLH to carry out a feasibility study for siting one or more aluminum smelters in the Province. This work is ongoing. Should it result in such facilities, it would be a major step forward for the Province and would significantly bolster the industrial sector's power use.

The second development is the announcement of a proposal by a consortium of US and Canadian companies to build a new network of undersea transmission linking New Brunswick, Nova Scotia and Maine with Boston and New York markets - Project Neptune. That this is even proposed indicates that cost reductions for such systems, together with the market prices occurring, means such a concept at least may be feasible. If the proponents are successful in attracting sufficient commitments to support construction and the project proceeds, it means that an alternative route to major markets might be available in the future, if the system can be expanded.

Project Neptune, as currently configured, supports two types of power exports from Canada. New Brunswick has indicated it expects to use its existing generators, which, like those on the Island of

Newfoundland are significantly under-used in the summer, to generate power to sell to the US when prices are highest. The proposal for Nova Scotia, on the other hand, is that dedicated gas-fired generation will be built solely to produce export power. Should it prove feasible to expand and extend Neptune to Newfoundland, NLH and others would have the opportunity both to sell summer excess capacity (e.g. Holyrood power) and once gas is available, to construct dedicated gas-fired generation. Such an opportunity may indeed be of assistance in proceeding with the development of the gas resources on our continental shelf, the full potential of which is estimated at more than 50 trillion cubic feet. The previously-mentioned gas development studies indicate that use of about 700 million cubic feet per day is required to support a pipeline to the Island from the Grand Banks. If it were all used to generate power, this would be enough to supply in the order of 3000 MW of generation.

The final potential step would be to build the Infeed and Gull Island with connections to Churchill Falls and Neptune to create a large loop system through which all generators would have routing options for delivering power to markets. Transmission lines would be used optimally, which would significantly reduce the unit costs of transmission. This would also significantly increase reliability for all parties using any part of the system, including Hydro Québec. Such a reliability increase may have the effect of increasing the overall export capacity of existing eastern Canada-US interties.

In such a situation, there would also likely be opportunity for NLH to sell summer power generated from Island hydroelectric plants, using some of the water normally stored for winter use. This power could then be replaced by purchased power during low-price times such as overnight and in the fall and spring. The existence of interconnections to both Labrador and the Maritimes and US Northeast should alleviate concerns over transmission system outages leaving the Island without sufficient power.

If this scenario continues to develop, it would support a restructuring of our electricity industry to provide the type of open-access transmission that would be a virtual necessity for generators in the Province to participate in the types of business that would become possible. The Composite Model described previously would be a major step in this direction.

The benefits to Newfoundland and Labrador from all this would be enormous. In addition to those described above, they would include the removal of any possible limitation to economic development due to the need for additional power and improved opportunities for energy-intensive industries to locate here for proximity to Labrador power with much improved reliability.

All this may appear to be somewhat fanciful, but given our enormous, undeveloped energy resources, it is not impossible. Some preliminary analysis done internally by the Department of Mines and Energy, before the Neptune Project was announced, indicated that with average wholesale prices of around 4.5 cents/kWh in the US, it may well be feasible to build transmission all the way from Gull to the Island and on to Maine to connect with the New England system. These price levels are within forecast range for the medium term. Refinement of this analysis and integration with the Neptune concepts remain to be done.

However, without partners, the Province's limited financial capability would likely prevent any of this from becoming reality. Effective partnerships are essential, with corporations possessing the financial resources to secure the multi-billion dollar investment necessary. Properly done, reasonable benefits will flow to all parties involved, but it must be realized that unless the Province is the only party with significant investment at risk, others must share in the benefits as well.

This would be a long endeavour. If started now, it will take until 2010 to build Gull Island, and gas is not anticipated to be available until about the same time. Development of the existing configuration of the Neptune project will also occupy its proponent's efforts until around 2006. Nevertheless, if this is the path that the Province elects to follow, it will be necessary to start as soon as possible.

Conclusions

This review of the electricity industry and its governing policies identified five major issues:

- a conflict for Newfoundland and Labrador Hydro directors and management between accountability to the Corporation's owner, Government, and to the regulator, the Board of Commissioners of Public Utilities;
- a system for evaluating private sector bids for new power projects that is transparently fair and free of conflict of interest;
- duplication of distribution and retail level services on the Island of Newfoundland creating inefficiencies that cost consumers in terms of higher rates;
- a need to reform the regulatory process to reduce the cost of regulation and provide incentives to regulated utilities to find and implement greater operational efficiency; and
- the future generation sources to be used and whether the moratorium on small-scale hydroelectric projects should be continued.

In addition to these issues, the policy review included the application of experience from other jurisdictions (introducing competition, unbundling) and assessment of the role of the electricity industry in economic development.

Solutions to the issues exist within the existing industry structure, but these are not necessarily the most appropriate set of solutions. Three potential alternative structures were presented: a Composite Model, a Single Utility Model and a Competitive Generation Model.

The Single Utility Model is potentially efficient, but achieving it requires Newfoundland and Labrador Hydro to acquire Newfoundland Power. This would probably be contentious and expensive. Regulating a single utility owned by Government would increase the accountability conflict, unless Government were willing to allow the utility full autonomy.

The Competitive Generation Model was found to be theoretically possible, but would involve very significant implementation costs and continued extra operating cost. Whether true competition would exist between different generation units owned by one Crown utility remains questionable. There would also be no "planning" for the overall system, since the necessary new facilities are supposed to be built as a result of purely private-sector investment decisions.

The Composite Model, a modification to the existing model with the transmission and system control and planning functions separated, or unbundled, from Newfoundland and Labrador Hydro, has several advantages over other structural options:

- it would, in the medium and long-term, reduce the regulatory burden;
- it could resolve the accountability conflict;
- while it would have some implementation costs, mostly in terms of detailed planning for the separation, these should be generally insignificant;
- ongoing operational costs should be no greater than in the Current Model, with the opportunity to reduce costs in the long term.

In addition, this structure contains elements of restructured industries elsewhere, without incurring the risks that competition brings.

Implementing this model could facilitate economic development in that it would more transparently allow industrial concerns to sell directly to one another, or to own self-generation, even when not on their existing facilities. Finally, in the event of interconnection between the Island and Labrador or elsewhere, the system operator approach would be more compatible with the situation in other jurisdictions.

Reforming the regulatory process itself does not depend on the structural alternatives adopted. There is support for changing to some type of performance-based regulation, although the general public has not yet been consulted. Nevertheless, such approaches to regulation are working elsewhere and appear to offer promise of reduced costs and lower rates.

Electricity pricing could be reformed to ensure that distributors recover their costs in a manner reflecting how those costs are incurred, rather than on the mark-up of purchased electricity and the consequent uncertainties of relying on forecast sales as a means of setting prices.

It was concluded that ruling out any generation source as a matter of policy is not appropriate, because it limits future choice, based on today's circumstances. The appropriate criteria for future generation selection should be that selected projects are environmentally acceptable and are the projects that best serve the overall public interest.

Finally, with respect to the role of electricity in economic development, it was found that there is little opportunity at present for any incentive rate program except for the Churchill Falls recall power. An efficient system with light-handed regulation that offers reasonable, relatively stable prices is the best that can be done. There is, however, tremendous opportunity for development within the electricity industry, based on Labrador power, Grand Banks gas and completion of a transmission system loop from the US Northeast through the Maritimes and Newfoundland to Gull Island and Churchill Falls.